

GDT 57

A. Scope

This method of test covers the determination of the interface bond shear strength between pavement layers using core samples.

This test shall be performed on six-inch (150 mm) diameter cores or specimens of asphalt.

This test is applicable if the asphalt overlay thickness as well as the thickness of the base concrete retrieved by coring are not less than two inches (50 mm) and not greater than six inches (150 mm).

B. Referenced Documents

AASHTO T-245 Standard Method of Test for Resistance to Plastic Flow of Bituminous Mixtures Using Marshal Apparatus

C. Obtaining Roadway Core Specimens

Select at least three random test locations.

Allow the pavement to cool before coring. Ice may be used to accelerate cooling before coring. Mark the direction of traffic on the roadway surface before coring so that it will be identified on each core.

Cores shall be taken full depth so that no prying action is needed to extract the cores from the pavement. Care shall be taken to avoid stress or damage to the interface during coring, handling or transporting. If a core separates at the interface to be tested during the coring operation, make a note of it on the coring report.

Label the core specimens with a paint pen or keel.

D. Apparatus

1. Bond Strength Test Device

The device used for the bond shear test shall be designed to accommodate a six-inch (150 mm) diameter test specimen. The device shall have a metal cylindrical specimen holder and a sliding metal loading head with a concave surface having a three-inch (75 mm) radius of curvature to apply load to the specimen. The gap between the specimen holder and the sliding loading head shall be 1/4 inch \pm 1/32 inch. The bond strength test device is illustrated in Figure 1.

2. Loading Machine

The loading machine shall produce a uniform vertical movement of two inches (50.8 mm) per minute. The Marshall Stability test apparatus or other mechanical or hydraulic testing machine may be used provided the rate of movement is maintained at two inches (50.8 mm) per minute while the load is being applied.

3. Wet Masonry Saw

E. Preparation of Test Specimens

1. Number of Test Specimens

A single test procedure shall consist of at least three specimens.

- Each roadway core specimen shall be six inches (150 mm) in diameter with the entire surface of the perimeter perpendicular to the top surface of the core within 1/4 inch (7 mm). If the height of the core above or below the

interface being tested is greater than three inches (75 mm), it shall be trimmed with a wet masonry saw to a height of approximately three inches (75 mm) from the interface.

- Identify the location of the interface with white or silver paint with three equally spaced marks approximately one inch long around the perimeter of each core.

F. Procedure

1. Specimen Dimensions

Measure the diameter of the core and the thickness of the overlay to the nearest 0.05 inch (1 mm). Measure the diameter in at least three locations and average the measurements.

2. Specimen Conditioning

Allow the specimens to stabilize at the test temperature of $77\text{ }^{\circ}\text{F} \pm 2\text{ }^{\circ}\text{F}$ ($25\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$) for a minimum of 2 hours in an air bath, or 40 minutes in a water bath in an enclosed leak-proof bag to protect it from getting wet.

3. Specimen Positioning

Orient the core in the bond strength device so that the direction of traffic marked on the core is aligned in the direction of the load (Fig 1). Also, ensure the marked interface is centered between the edge of the loading block and the edge of the loading head.

Align the loading head adjacent to the bonded interface. The loading head shall rest parallel to the bonded interface on the asphalt overlay portion of the specimen. Sample positioning and loading is shown in Figure 1.

4. Rate of Displacement

Apply the displacement continuously and without shock at a constant strain rate of two inches (50.8 mm) per minute until failure occurs. Record the maximum load in pounds, (P_{MAX}), carried by the specimen during the test.

G. Calculations

Calculate the bond shear strength, (S_B), as follows:

$$S_B = P_{MAX} / A$$

where:

S_B = bond shear strength, pounds per square inch, (psi)
 P_{MAX} = maximum load applied to specimen, pounds-force, (lbf)
 A = cross sectional area of test specimen, square inches, (in^2)

and:

$$A = \frac{\pi D^2}{4}$$

where:

A = cross sectional area of test specimen, square inches (in^2)
 D = average diameter of test specimen, inches (in)

H. Report

Record each core identification, sampling date, and test date.

Note the appearance of the interface including any contaminants, milling striations, stripping, tack coat streaks, or other observations.

Record the test results for each core as follows:

1. Specimen dimensions including thickness of the overlay asphalt, thickness of the existing layer, average diameter and the cross-sectional area.
2. Maximum load applied, rounded to the nearest pounds-force.
3. Bond shear strength, rounded to the nearest psi.

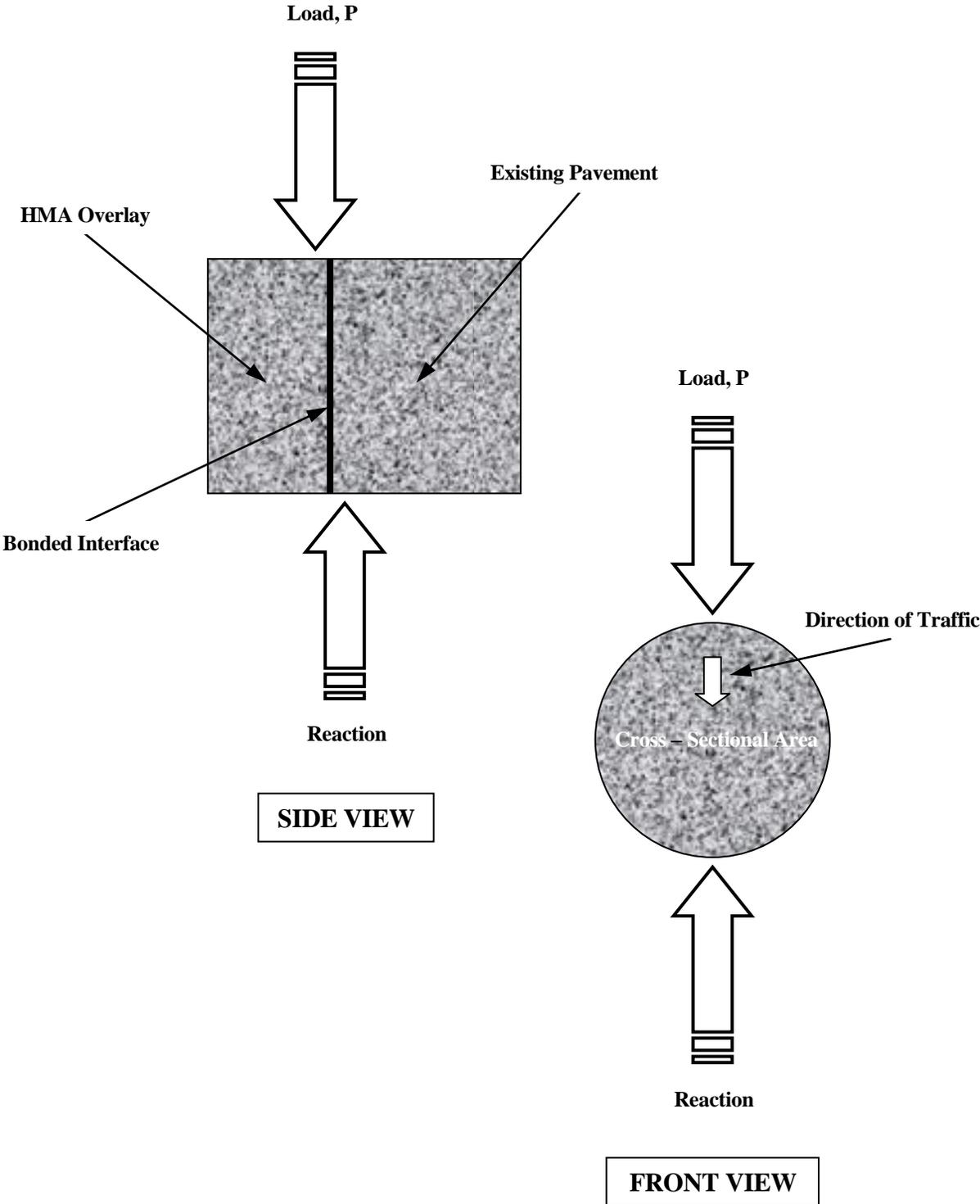


Figure 1. Loading Scheme for Bond Strength Test